WHAT I CLAIM IS:

1. An electrically small, wideband circularly polarized compact microstrip antenna, comprising:

a radiating arch on a top surface of a microstrip dielectric substrate, said radiating arch further comprising a plurality of arc-shaped segments terminating in straight edges defining a plurality of gaps between said segments;

said microstrip dielectric substrate being stacked on a conductive ground plane;

said radiating arch, being thinner than said dielectric substrate, and said dielectric substrate being at least as thick as said ground plane;

a center probe of a coaxial connector projects upwardly through said ground plane, said dielectric substrate and an opening in a first one of said segments, said opening having an opening diameter greater than a probe diameter of said center probe prevents an electrical contact between the said center probe and said first segment;

said antenna having a given length, A_L, and a given bandwidth, generates a leaky wave radiation;

said radiating arch having an inner edge, an outer edge, a first straight end, a second straight end and a path length difference between said plurality of gaps, said inner edge being shorter than said outer edge;

said radiating arch generating a plurality of electrical fields perpendicular to said first end, said second end and said plurality of straight edges; and

said radiating arch, said perpendicular electrical fields and said path length difference permits said leaky wave radiation to leak by propagating under said segments, advantageously causing an increased bandwidth and resulting in a wideband circularly polarized radiation with a 47 % bandwidth permitting a decreased antenna length, A_D.

2. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 1, further comprising said decreased antenna length, A_D, being shorter than said given length, A_L.

3. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 2, further comprising said radiating arches causing said leaky wave radiation to travel along said radiating arches in a circular direction.

4. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 3, further comprising said arc-shaped segments being flat.

5. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 4, further comprising said plurality of flat arc-shaped segments being arranged in a semicircle.

6. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 5, further comprising said plurality of gaps being narrow.

7. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 6, further comprising said plurality of gaps having a gap width of about 0.2 mm.

8. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 7, further comprising said inner edge being shorter than said outer edge creates said path length difference between said plurality of narrow gaps.

9. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 8, further comprising said dielectric substrate having a thickness, t_2, greater than a thickness, t_3, of said ground plane.

10. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 9, further comprising said thickness, t_2, of the dielectric substrate being greater than a thickness, t_1, of said radiating arch.

11. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 10, further comprising said ground plane being composed of a conductive metal.

12. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 11, further comprising said radiating arch being composed of a conductive metal.

13. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 12, wherein said conductive metal is copper.

14. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 13, further comprising said increased bandwidth being achieved by increasing a ratio of R2/R1.

15. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 14, further comprising said increased bandwidth being achieved by adjusting said gap width.

16. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 15, further comprising said dielectric substrate being composed of a low loss dielectric material.

17. An electrically small, wideband circularly polarized compact microstrip antenna array, comprising:

a plurality of radiating arches located on a top surface of a microstrip dielectric substrate, said plurality of radiating arches further comprising a plurality of arc-shaped segments terminating in straight edges defining a plurality of gaps between said segments;

said microstrip dielectric substrate being stacked on a conductive ground plane;

said radiating arches, being thinner than said dielectric substrate, and said dielectric substrate being at least as thick as said ground plane;

each of said plurality of radiating arches having a first segment with an opening;

a power supply network disposed beneath said ground plane feeds RF power to a plurality of center probes projecting upwardly through said ground plane, said dielectric substrate and said openings, said openings each having an opening diameter greater than a probe diameter of said center probe prevents an electrical contact between the said center probe and said first segments;

said antenna array having a given antenna array length, A_{AL}, and a given bandwidth, generates a leaky wave radiation, said antenna array being configured in a size of about one half of a wavelength;

each of said plurality of radiating arches having an inner edge, an outer edge, a first straight end, a second straight end and a path length difference between said plurality of gaps, said inner edges being shorter than said outer edges;

said plurality of radiating arches generating a plurality of electrical fields perpendicular to said first end, said second end and said plurality of straight edges; and

said plurality of radiating arches, said perpendicular electrical fields and said path length differences permit said leaky wave radiation to leak by propagating under said segments, advantageously causing an increased bandwidth and resulting in a wideband circularly polarized radiation with a 47 % bandwidth permitting a decreased antenna array length, A_{AD}.

18. The electrically small, wideband circularly polarized compact microstrip antenna array, as recited in claim 17, further comprising said decreased antenna length, A_{AD}, being shorter than said given length, A_{AL}.

19. The electrically small, wideband circularly polarized compact microstrip antenna array, as recited in claim 18, further comprising said plurality of radiating arches causing said leaky wave radiation to travel along said plurality of radiating arches in a circular direction.

20. The electrically small, wideband circularly polarized compact microstrip antenna array, as recited in claim 19, further comprising said arc-shaped segments being flat.

21. The electrically small, wideband circularly polarized compact microstrip antenna array, as recited in claim 20, further comprising said radiating arch further comprising a plurality of flat arc-shaped segments arranged in a 90° rotation.

22. The electrically small, wideband circularly polarized compact microstrip antenna array, as recited in claim 21, further comprising said plurality of gaps being narrow.

23. The electrically small, wideband circularly polarized compact microstrip antenna array, as recited in claim 22, further comprising each of said plurality of gaps having a gap width of about 0.2 mm.

24. The electrically small, wideband circularly polarized compact microstrip antenna array, as recited in claim 23, further comprising said inner edges being shorter than said outer edges creating a plurality of path length differences between said plurality of narrow gaps.

25. The electrically small, wideband circularly polarized compact microstrip antenna array, as recited in claim 24, further comprising said dielectric substrate having a thickness, t_2, greater than a thickness, t_3, of said ground plane.

26. The electrically small, wideband circularly polarized compact microstrip antenna array, as recited in claim 25, further comprising said thickness, t_2, of the dielectric substrate being greater than a thickness, t_1, of said plurality of radiating arches.

27. The electrically small, wideband circularly polarized compact microstrip antenna array, as recited in claim 26, further comprising said ground plane being composed of a conductive metal.

28. The electrically small, wideband circularly polarized compact microstrip antenna array, as recited in claim 27, further comprising said plurality of radiating arches being composed of a conductive metal.

29. The electrically small, wideband circularly polarized compact microstrip antenna array, as recited in claim 28, wherein said conductive metal is copper.

30. The electrically small, wideband circularly polarized compact microstrip antenna array, as recited in claim 29, further comprising said increased bandwidth being achieved by adjusting said gap widths.

31. The electrically small, wideband circularly polarized compact microstrip antenna array, as recited in claim 30, further comprising said dielectric substrate being composed of a low loss dielectric material.

32. An electrically small, wideband circularly polarized compact microstrip antenna, comprising:

a radiating arch on a top surface of a microstrip dielectric substrate, said radiating arch further comprising a plurality of flat arc-shaped segments arranged in a semicircle, said segments terminating in straight edges defining a plurality of narrow gaps between said segments;

said microstrip dielectric substrate being stacked on a conductive ground plane;

said radiating arch, a thickness, t_1, less than a thickness, t_2, of said dielectric substrate, said thickness, t_2, being greater than a thickness, t_3, of said ground plane.

a center probe of a coaxial connector projects upwardly through said ground plane, said dielectric substrate and an opening in a first one of said segments, said opening having an opening diameter greater than a probe diameter of said center probe prevents an electrical contact between the said center probe and said first segment;

said antenna having a given length, A_L, and a given bandwidth, generates a leaky wave radiation;

said radiating arch having an inner edge, an outer edge, a first straight end, a second straight end and a path length difference between said plurality of gaps, said inner edge being shorter than said outer edge;

said radiating arch generating a plurality of electrical fields perpendicular to said first end, said second end and said plurality of straight edges; and

said radiating arch, said perpendicular electrical fields and said path length difference permits said leaky wave radiation to leak by propagating under said segments, advantageously causing an increased bandwidth and resulting in a wideband circularly polarized radiation with a 47 % bandwidth permitting a decreased antenna length, A_D.

33. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 32, further comprising said decreased antenna length, A_D, being shorter than said given length, A_L.

34. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 33, further comprising said radiating arch causing said leaky wave radiation to travel along said radiating arch in a circular direction.

35. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 34, further comprising said center probe extending upwardly slightly above said first segment.

36. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 35, further comprising said plurality of gaps having a gap width of 0.2 mm.

37. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 36, further comprising said inner edge being shorter than said outer edge creates said path length difference between said plurality of narrow gaps.

38. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 37, further comprising said ground plane being composed of a conductive metal.

39. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 38, further comprising said radiating arch being composed of a conductive metal.

40. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 39, wherein said conductive metal is copper.

41. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 40, further comprising said dielectric substrate being composed of a low loss dielectric material.

42. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 41, further comprising said low loss dielectric material being Duroid ™.

43. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 42, further comprising said increased bandwidth being achieved by increasing a ratio of R2/R1.

44. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 43, further comprising said increased bandwidth being achieved by adjusting said gap width.

45. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 44, further comprising said perpendicular electrical fields and said path length difference causing said increased bandwidth.

46. The electrically small, wideband circularly polarized compact microstrip antenna, as recited in claim 45, further comprising said perpendicular electrical fields and said path length difference causing said increased bandwidth because said inner edge is substantially shorter than said outer edge.

47. A method for decreasing a wideband circularly polarized compact microstrip antenna with a given length, A_L, comprising the steps of:

arranging a plurality of flat arc-shaped segments in a semicircle, said segments terminating in straight edges defining a plurality of narrow gaps between said segments;

forming a radiating arch from said segments, said radiating arch having an inner edge, an outer edge, a first straight end, a second straight end and a path length difference between said plurality of narrow gaps in said radiating arch, said inner edge being shorter than said outer edge;

placing said radiating arch on a top surface of a microstrip dielectric substrate, said dielectric substrate being thicker than said radiating arch;

stacking said microstrip dielectric substrate on a conductive ground plane, said dielectric substrate being at least as thick as said ground plane;

projecting a center probe of a coaxial connector upwardly through said ground plane, said dielectric substrate and an opening in a first one of said segments, said opening having an opening diameter greater than a probe diameter of said center probe prevents an electrical contact between said center probe and said first segment;

forming said antenna with said given length, A_L, and a given bandwidth to generate a leaky wave radiation, said antenna being electrically small;

generating a plurality of electrical fields perpendicular to said first end, said second end and said plurality of straight edges; and

permitting said leaky wave radiation to leak by propagating under said segments, said radiating arch, said perpendicular electrical fields and said path length difference advantageously causing an increased bandwidth and resulting in a wideband circularly polarized radiation with a 47 % bandwidth permitting a decreased antenna length, A_D.

48. The method for decreasing a wideband circularly polarized compact microstrip antenna with a given length, A_L, as recited in claim 47, further comprising the step of providing said decreased antenna length, A_D, shorter than said given length, A_L.

49. The method for decreasing a wideband circularly polarized compact microstrip antenna with a given length, A_L, as recited in claim 48, further comprising the step of causing said leaky wave radiation to travel along said radiating arch in a circular direction.

50. The method for decreasing a wideband circularly polarized compact microstrip antenna with a given length, A_L, as recited in claim 49, further comprising the step of configuring said center probe to extend upwardly slightly above said first segment.

51. The method for decreasing a wideband circularly polarized compact microstrip antenna with a given length, A_L, as recited in claim 50, further comprising the step of forming said plurality of gaps with a gap width of about 0.2 mm.

52. The method for decreasing a wideband circularly polarized compact microstrip antenna with a given length, A_L, as recited in claim 51, further comprising the step of providing said inner edge shorter than said outer edge to create said path length differences between said plurality of narrow gaps.

53. The method for decreasing a wideband circularly polarized compact microstrip antenna with a given length, A_L, as recited in claim 52, further comprising the step of forming said ground plane from a conductive metal.

54. The method for decreasing a wideband circularly polarized compact microstrip antenna with a given length, A_L, as recited in claim 53, further comprising the step of forming said radiating arch from said conductive metal.

55. The method for decreasing a wideband circularly polarized compact microstrip antenna with a given length, A_L, as recited in claim 54, wherein said conductive metal is copper.

56. The method for decreasing a wideband circularly polarized compact microstrip antenna with a given length, A_L, as recited in claim 55, further comprising the step of forming said dielectric substrate from a low-loss dielectric material.

57. The method for decreasing a wideband circularly polarized compact microstrip antenna with a given length, A_L, as recited in claim 56, wherein said low-loss dielectric material is Duroid ™.

58. The method for decreasing a wideband circularly polarized compact microstrip antenna with a given length, A_L, as recited in claim 57, further comprising the step of increasing a ratio of R2/R1 to achieve said increased bandwidth.

59. The method for decreasing a wideband circularly polarized compact microstrip antenna with a given length, A_L, as recited in claim 58, further comprising the step of adjusting said gap width to achieve said increased bandwidth.

60. The method for decreasing a wideband circularly polarized compact microstrip antenna with a given length, A_L, as recited in claim 59, wherein said perpendicular electrical fields and said path length difference cause said increased bandwidth because said inner edge is substantially shorter than said outer edge.